

ARCH 4343/5339:

Introduction to Digital Fabrication Methodologies/ Digital Tectonics
Fall 2016

Instructor: Associate Professor Brad Bell with Hunter Roth, Digital Fabrication Specialist at CAPPA

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Office Hours: Wednesday 12:00 – 2:00 or by appointment

Section Information: ARCH 4343/5339-001

Time/ Place of Class: College of Architecture Planning & Public Affairs: ARCH 324 MWF 11:00 – 11:50

Description of Course Content: This course introduces a historical and methodological framework for the use of CAD/CAM technology in the design process. Particular focus is given to architectural applications at a variety of scales and mediums. Students will gain knowledge in fabrication techniques such as 2D subtractive, 3D additive and 3D subtractive as well as advanced digital software for 3D digital modeling and algorithmic modelling software.

Student Learning Outcomes:

The Learning objectives will be evaluated through the 3 elements of the Course Structure as listed above. A summary of those objectives is as follows:

- General introduction to the theoretical underpinnings of current CAD/CAM technology.
- Historical reference for the factors contributing to the use of CAD/CAM technology.
- Role of CAD/CAM technology in the present architecture profession.
- Relevance of CAD/CAM to associated design professions.
- Preliminary introduction to complex geometric modeling techniques.
- General introduction to the techniques of 2D and 3D CAM fabrication.
- Translation of complex 3D geometric modeling to 2D fabrication templates.
- Hands-on introduction to the use of the laser cutter.

Required Textbooks and Other Course Materials: A series of readings will be conducted throughout the semester. These readings will be made available to students electronically via a Google drive account. The following is the list of books from which the readings have been selected from:

- **Digital Fabrications: Architectural and Material Techniques.** Edited By Lisa Iwamoto (Princeton Architectural Press, New York, NY, 2009)
- **Digital Design and Manufacturing: CAD/CAM Applications in Architecture and Design.** By Daniel Shodek,, Martin Bechthold, Kimo Griggs, Kenneth Martin Kao, Marco Steinberg (Wiley Press 2005)
- **Material Strategies in Digital Fabrication.** By Christopher Beorkrem (Routledge Press, NY 2013)

Descriptions of major assignments and examinations: The lecture/seminar course will be comprised of 4 methodology projects demonstrating digital tectonic strategies. The last assignment will serve as the “Final Exam” for the course. A list of relevant dates for assignments can be found in the “Schedule” section of this syllabus.

Attendance: At The University of Texas at Arlington, taking attendance is not required. Rather, each faculty member is free to develop his or her own methods of evaluating students’ academic performance, which includes establishing course-specific policies on attendance. As the instructor of this section, I have established following attendance policy: Attendance to all classes is mandatory. One unexcused absence is permitted throughout the entirety of the semester without impact on grading. Every absence thereafter will result in a full letter grade deduction in the *Participation* grading (see grading section below.) Excused absences are qualified as those where circumstances such as illness or pre-arranged coordination with the

instructor has resulted in missing class. In the event of illness a doctor's note is required to be considered excused.

Grading:

- Assignment 1: Contouring 25%
- Assignment 2: 3D printing 20%
- Assignment 3B: Tessellating 15%
- Assignment 4: CNC Milling 35%
- Participation 5%

Students are expected to keep track of their performance throughout the semester and seek guidance from available sources (including the instructor) if their performance drops below satisfactory levels; see "Student Support Services," below.

Expectations for Out-of-Class Study: Beyond the time required to attend each class meeting, students enrolled in this course should expect to spend at least an additional 30 hours per week of their own time in course-related activities, including reading required materials, completing assignments, preparing for exams, etc.

Grade Grievances: Any appeal of a grade in this course must follow the procedures and deadlines for grade-related grievances as published in the current University Catalog.

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://wweb.uta.edu/aao/fao/>).

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Disability Accommodations: UT Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including *The Americans with Disabilities Act (ADA)*, *The Americans with Disabilities Amendments Act (ADAAA)*, and *Section 504 of the Rehabilitation Act*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of disability. Students are responsible for providing the instructor with official notification in the form of a **letter certified** by the Office for Students with Disabilities (OSD). Only those students who have officially documented a need for an accommodation will have their request honored. Students experiencing a range of conditions (Physical, Learning, Chronic Health, Mental Health, and Sensory) that may cause diminished academic performance or other barriers to learning may seek services and/or accommodations by contacting:

The Office for Students with Disabilities, (OSD) www.uta.edu/disability or calling 817-272-3364.

Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability.

Counseling and Psychological Services, (CAPS) www.uta.edu/caps/ or calling 817-272-3671 is also available to all students to help increase their understanding of personal issues, address mental and behavioral health problems and make positive changes in their lives.

Non-Discrimination Policy: The University of Texas at Arlington does not discriminate on the basis of race, color, national origin, religion, age, gender, sexual orientation, disabilities, genetic information, and/or veteran status in its educational programs or activities it operates. For more information, visit uta.edu/eos.

Title IX: The University of Texas at Arlington is committed to upholding U.S. Federal Law “Title IX” such that no member of the UT Arlington community shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity. For more information, visit www.uta.edu/titleIX.

Academic Integrity: Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code:

I pledge, on my honor, to uphold UT Arlington’s tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence.

I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents’ Rule* 50101, §2.2, suspected violations of university’s standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student’s suspension or expulsion from the University.

Lab Safety Training: Students registered for this course must complete all required lab safety training prior to entering the lab and undertaking any activities. Once completed, Lab Safety Training is valid for the remainder of the same academic year (i.e., through the following August) and must be completed anew in subsequent years. There are no exceptions to this University policy. Failure to complete the required training will preclude participation in any lab activities, including those for which a grade is assigned. It is expected that all students will use the Digital Fabrication Lab and therefore will have had proper training on the equipment found there in. If any student has not gone through proper training then he or she should immediately address this issue by taking the first available class offered in the semester.

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as “lecture,” “seminar,” or “laboratory” shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student’s feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington’s effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit <http://www.uta.edu/sfs>.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade,

except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Emergency Exit Procedures: Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, [which is located at the south end of the building](#). When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

Student Support Services: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at www.uta.edu/resources.

Writing Center: The Writing Center, 411 Central Library, offers individual 40 minute sessions to review assignments, *Quick Hits* (5-10 minute quick answers to questions), and workshops on grammar and specific writing projects. Visit <https://uta.mywconline.com/> to register and make appointments. For hours, information about the writing workshops we offer, scheduling a classroom visit, and descriptions of the services we offer undergraduates, graduate students, and faculty members, please visit our website at www.uta.edu/owl/.

Letter Grade Definitions

A - Exceptional: Mastery of course content at the highest level of attainment that can reasonably be expected of students at a given stage of development.

B - Above Average: Strong performance demonstrating a high level of attainment for a student at a given stage of development.

C - Average: A totally acceptable performance demonstrating an adequate level of attainment for a student at a given stage of development

D – Poor: A marginal performance in the required exercises demonstrating a minimal passing level of attainment.

F – Failing: For whatever reason, an unacceptable performance. The F grade indicates that the student's performance in the required exercises has revealed almost no understanding of the course content.

Course Schedule

F 08-25 Course Introduction (Reading 1)

M 08-28 Lecture 1: Digital Morphogenesis

W 09-30 Lecture 2: Digital Tectonics (Reading 2)

F 09-01 Lecture 3: Computer Aided Manufacturing (CAM) 2D (Reading 3)

M 09-04 **LABOR DAY: No Class**

W 09-06 Lecture 4: Computer Aided Manufacturing (CAM) 3D (Reading 4)

F 09-08 Lecture 5: Computer Aided Manufacturing (CAM) 3D (Reading 5)

M 09-11 Lab 1: Rhino

W 09-13 Lab 2: Rhino

F 09-15 Lab 3: Rhino

M 09-18 Assignment 1: Digital - Contouring

W 09-20 Assignment 1: Digital - Contouring

F 09-22 Assignment 1: Shop Tutorial_ Test Cut submitted - MEET IN DIG FAB LAB

M 09-25 Assignment 1: Assembly - Contouring

W 09-27 Assignment 1: Assembly - Contouring
 F 09-29 **Assignment 1: Submittal** | Assignment 2: 3D Printing

M 10-02 Lab 5: Rhino
 W 10-04 Lab 6: Rhino
 F 10-06 Assignment 2: 3D Printing _ Modeling

M 10-09 Lab 7: Shop Tutorial 3D 3D Printing (Simplify Software) MEET IN DIG FAB LAB
 W 10-11 Assignment 2: 3D Printing _ Printing
 F 10-13 Assignment 2: 3D Printing _ Printing

M 10-16 **Assignment 2: Submittal** | Assignment 3: Tessellating
 W 10-18 Lab 8: Grasshopper
 F 10-20 Lab 9: Grasshopper

M 10-23 Lab 10: Grasshopper
 W 10-25 Lab 11: Grasshopper
 F 10-27 Assignment 3B: Tessellating _ Grasshopper

M 10-30 Assignment 3B: Tessellating _ Grasshopper
 W 11-01 Assignment 3B: Tessellating _ Grasshopper [*LAST DAY TO DROP CLASS @ 4:00pm*]
 F 11-03 Assignment 3B: Tessellating _ Grasshopper

M 11-06 Assignment 3B: Tessellating _ Grasshopper
 W 11-08 **Assignment 3: Submittal** | Assignment 4: CNC Milling
 F 11-10 Lab 12: Software Tutorial_ (Rhino CAM Software)

M 11-13 Lab 12: Shop Tutorial_ CNC Milling - MEET IN DIG FAB LAB
 W 11-15 Assignment 4: CNC Milling
 F 11-17 Assignment 4: CNC Milling

M 11-20 Assignment 4: Casting Tutorial - MEET IN SHED
 W 11-22 Assignment 4: CNC Milling In DIG FAB LAB
 F 11-24 **Thanksgiving Holiday: No Class**

M 11-27 Assignment 4: CNC Milling - In DIG FAB LAB
 W 11-29 Assignment 4: CNC Milling - In DIG FAB LAB
 F 12-01 **Assignment 4: Submittal** (Final Material)

M 12-04 Assignment 4: CNC Milling In DIG FAB LAB
 W 12-06 Assignment 4 Project Consultation
 W 12-13 **11:00 pm: Final Documentation due to Google drive folder**

All students are required to be present for setting up final display of material. No exceptions.

As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. *Associate Professor Brad Bell*

Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at **817-272-3003** (non-campus phone), **2-3003** (campus phone). You may also dial 911.

UTA Police Department's emergency phone number into your own mobile phone for non-emergencies, contact the UTA PD at 817-272-3381.

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